

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF CONSERVATION
DIVISION OF FORESTRY

file



the State Forester's 1966 REPORT

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The STATE FORESTER'S 1966 REPORT



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SACRAMENTO, CALIFORNIA

1967

FOREST SERVICE

REPORT

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THE STATE FORESTER'S 1918 REPORT



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1918

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THE STATE FORESTER'S 1966 REPORT

THE STATE BOARD OF FORESTRY

The State Board of Forestry represents the State's interest in acquiring and managing state forests, and in federal land matters pertaining to forestry. It is concerned also with protection of the State's interest in forest resources on private land. The Board determines and maintains an adequate forest policy, and general policies for guidance in administration of the Division of Forestry.

The Board held nine regular meetings during 1966. In addition to attending regular meetings, the chairman and individual members contributed appreciable time to special hearings, conferences, and meetings of eight other boards and committees concerned with natural resources problems. Various members of the Board participated in work of timber maturity boards, established under the State constitution.

A topic of major interest to the Board was implementation of the procedure for filing affidavits for exemption of immature timber trees from taxation, required by provisions of Chapter 1847, Statutes of 1965. Proposed establishment of a national redwood park, and its potential impact on the forest economy of northwestern California was considered. Legislative matters were given attention, including effective support for a proposed major increase in Fire Prevention effort.

In carrying out its responsibilities, the Board studies forest conditions throughout the State. Periodically it examines various aspects of forest management and utilization in different parts of California.

The June meeting, held in Eureka, was preceded by a four-day field study of forestry in the redwood

region. During June 20-25, 1966, the Board traveled in Humboldt and Del Norte Counties, made on-the-ground observations, and heard a number of prepared reports. Field trips included lands of seven industrial forestry operators, and the United States Forest Service Yurok Experimental Forest. Observations were made on lands logged before State regulation authorized by the Forest Practice Act; on lands logged under basic rules for the Redwood Forest District; and on lands from which timber has been harvested under "alternate plans" approved by the State Board of Forestry. Conditions were observed on lands where "alternate plans" approved by the Board had been in effect for up to seven years. The Board, and the State Forester, participated in dedicating additional forests into the American Tree Farm system, and inspected a pulp mill.

A one-day field study in the Sierra Pine Forest Region preceded the August meeting. The Board inspected a new fire protection facility of the California Division of Forestry; studied forest regeneration, management, and harvesting practices; and considered fire protection problems in the Pine Region. They participated in dedication of a Tree Farm, marking the 25th Anniversary of the American Tree Farm system.

At various times during the year the Board received recommendations of the State Forester's Reforestation Advisory Committee and other committees; heard reports on activities of forest practice committees; and reviewed programs of the Division of Forestry.

There were no changes in membership of the State Board of Forestry during 1966.

EXECUTIVE

The Year in Review

In Santa Barbara, on April 25, State Forester Francis H. Raymond presented testimony to the Subcommittee on Forests, House Committee on Agriculture, of the U.S. Congress. This testimony showed protection from uncontrolled fire is needed on some 66 percent of the total land area of the State. He further stated that the U.S. Forest Service should maintain the same standards, and require the same standards of all users

of National Forests, as are imposed on users of other lands in California.

At a meeting held in Santa Rosa by Congressman Clausen, on April 29, the State Forester explained the forest fire situation in California. He pointed out various aspects of the State Forester's Fire Protection Plan which, if implemented, could reduce the number of fires by about 60 percent within a short period of years.

In May, Chief Deputy State Forester Lewis Moran presented the keynote address to the annual spring meeting of the Southern California Foresters and Firewardens in Santa Barbara County. Mr. Moran commended that Association for their cooperation and activities which provide for effective coordination of forest and fire control activities throughout the area represented by their membership.

On June 23, speaking at the dedication of the Big Lagoon Unit of Georgia-Pacific Tree Farms, in Humboldt County, the State Forester recognized the value of Tree Farms. He said, "... because of its vast timberlands, high forest growth potential, and enlightened and improved management brought about by modern tree farming, I firmly believe that Humboldt has excellent prospects of enjoying a healthy and substantial timber economy in perpetuity."

The fact that Forest Practice Rules apply to only 3 percent of the State's total land area—the private commercial forest land—was emphasized by the State Forester in a presentation to the Assembly Committee on Natural Resources, Planning, and Public Works at a hearing in Berkeley on August 17 in connection with their study of the Forest Practice Act.

At the 44th Annual Meeting of the National Association of State Foresters in Williamsburg, Virginia, in October, it was decided that the 45th meeting would be held in California, October 1 to 5, 1967. As host State Forester, Mr. Raymond has appointed various committees to provide an effective meeting—the first in California since 1947. After considering many proposals, it was decided the meeting would be held in Sacramento with "headquarters" at the Senator Hotel.

State Foresters of the "Intermountain" States have invited the State Foresters of Washington, Oregon, and California to join their group, which then would be renamed the "Western State Foresters"—a group with more or less common and related problems and programs.

State Forester Raymond was the keynote speaker at the Northwest Forest Fire Council meeting on November 1, 1966, at Portland, Oregon. His subject, "Protection and the Public," provided an opportunity to point out that administrators of various "protection" agencies owe the public an explanation of services which might be expected but are *not* provided. He emphasized effective fire prevention is an increasingly important activity of owners or occupants of forest resources and improvements. This will help reduce fire losses in forest areas during seasons when a public fire service is not readily available.

Mr. Raymond presented a statement, on November 10, to the joint hearing of the Senate Committee on Transportation and Public Utilities and the Assembly Committee on Natural Resources, Planning, and Public Works. He pointed out that management of land is essential—whether it be for forest, range, watershed, aesthetic, or scenic purposes.

Training Activities

It is the objective of the Division Training Program to constantly improve quality of the Division's services by increasing effectiveness of employees through development and improvement of work habits, knowledge, and skills.

In fulfilling this objective the Division continued the basic five-week Fire Control courses for Forest Fire Truck Drivers, Forestry Foremen, and Forestry Equipment Operators.

Air Operations involving use of air tankers and helicopters in combatting forest fires have developed to the point where special skills and knowledge in the use and management of these valuable tools are required of Fire Control personnel. To meet this need, Fire Control specialists participated with the U.S. Forest Service in developing and conducting special one-week Operational Training courses for Air Base Managers and Helitack Foremen.

During the year plans for Joint Agency Middle Management Training were completed. At year's end the first group of Field Rangers had completed this two-week course emphasizing principles of organization and management. Basic Law Enforcement Training for Administrators and Field Fire Prevention personnel continued throughout the year. Training and Fire Control personnel participated in planning and presentation of the Second Annual Fire Services Staff and Command School, for Command Officers of all Fire Services in the State.

Plans for 1967 include early summer activation of the new 50-man Northern California Training Center at Ione. Enlarged and improved facilities at the new Center will make possible expansion of Fire Control Training, to include courses in Advanced Foremanship and Fire Management, for Assistant State Forest Rangers.

Planning and Coordination

Forest conservation policy was the main focus of the State Forester's long-range program planning in 1966.

The second phase of State Development Plan work resulted in publication of "Resource Policy Directions for California" by the Resources Agency. Much

internal and interdepartmental effort was required to prepare the forest and wildland portion of this study.

Hearings on the relationship of stream flow, erosion, and forest practices were held by the Assembly Committee on Natural Resources, Planning and Public Works. A detailed analysis of the history, application and operation of the Forest Practice Act was prepared for these hearings. Digests of forest practice laws and forest tax laws of the fifty states were prepared for this Assembly Committee.

Review of policies of the Board of Forestry was initiated by a "task force" of Deputy State Foresters and the Program Planner.

FIRE CONTROL

The Fire Control Section is responsible for fire control planning and fire control civil defense and other emergency operations of the California Division of Forestry, including statewide dispatching of forces. Fire control research and equipment development, and management of the Division's communications system and automotive fleet are also section responsibilities. Liaison is maintained with numerous cooperating and contracting agencies as well.

The 1966 Fire Season

The 1966 fire season was one of above normal seasonal severity, and is considered to have been the third worst fire season of the past ten years, ranking behind 1961 and 1960. The State experienced an unusually dry winter during 1965-66 with almost all of the seasonal rainfall occurring prior to January. The effect of drouth conditions on the drying of fine fuels was accelerated by the amount of north and east winds which occurred during the spring period. May and June were generally warm and dry. June was one of the warmest of record in the central and northern parts of the State. Spring fire activity was the heaviest in many years. During the month of June there was a number of large fires in the Santa Barbara County area of the Central Coast, and in the south San Joaquin counties of Kern and Tulare. The fire season was unique in the limited number of thunderstorm days and small amount of lightning activity. Although summer months were generally quite warm, this was offset by a relative lack of wind patterns over broad areas. Only one period of fall north winds occurred in the northern part of the State this year. This was of moderate intensity, affecting primarily the southern part of the North Coast District, where burning permits were suspended during the period September 27-30. This was in contrast to the more

Organizational structure of the Division of Forestry was studied. Instructions explaining the organizational structure, and responsibilities of organizational units and employees, were prepared.

A study of land use problems and the application of Division programs in the Lake Tahoe Basin was started.

Review and research of long-range objectives and plans of the Division's programs and functions continued. This work involves both internal goals and correlation of forest conservation goals with other sectors of government and the economy.

severe north winds experienced in this same area in September of 1964 and 1965. Preliminary statistics indicate that during 1966 the Division suppressed 4,230 wildland fires within its area of direct protection. This is the highest incidence of record (fig. 1). Despite the potentials and high incidence, only 92,333 acres were burned by these numerous fires—the fifth lowest burned acreage of record (fig. 1). There were

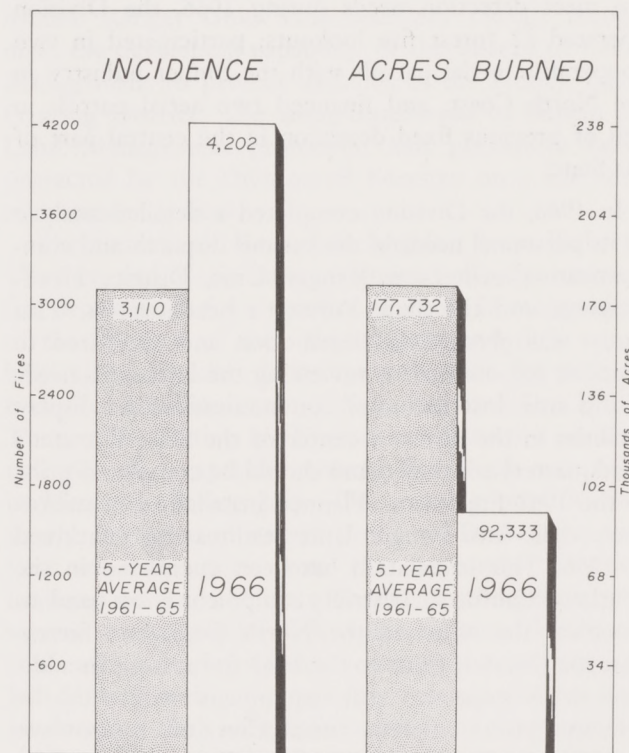


Fig. 1. Fire incidence and area burned, State responsibility areas, direct protection area of the California Division of Forestry. Although the number of fires in 1966 was one-third greater than the five-year average for 1961-65, the total acreage burned was only half the five-year average.

36 large fires (300 acres or greater) during the fire season period. Rapid, strong initial attack by ground and air forces, supported by conservation camp crews and total organizational depth, are given credit for the small number of large fires and the below average burned acreage.

In September a forestry equipment operator and forest firetruck driver were badly burned in the Nevada Ranger Unit, while engaged in suppressing a brush and timber fire. Although seriously burned, the use of a reflective, fire-resistant blanket—a safety item on Division bulldozers—apparently prevented burn fatalities. On November 3, an equipment operator employed by the clearing contractor at Oroville Dam was killed when his bulldozer rolled on a steep slope while engaged in suppressing a fire caused by clearing activities.

Detection, Communications, and Facilities

Effective July 1, 1966, personnel were initially budgeted to man Likely Mountain Lookout near the Lassen-Modoc County Line. This facility fills a substantial detection void in this area and is the first additional fixed detection unit in a number of years. To meet detection needs during 1966, the Division operated 82 forest fire lookouts; participated in two cooperative aerial patrols with the timber industry in the North Coast; and financed two aerial patrols in lieu of previous fixed detection in the central part of the State.

In 1966, the Division completed a detailed analysis of its personnel needs in the various dispatch and communication centers at Ranger Unit, District Headquarters, and the State Forester's headquarters. This study was given field distribution and presented to agencies responsible for reviewing the Division's needs in this area. Installation of communication and display facilities in the dispatch center of the State Forester's headquarters continued and should be completed prior to the 1967 fire season. Planned installation of microwave radio into Ranger Unit headquarters continued in 1966. This installation has been completed in the Southern California District; equipment is on hand to complete the effort in the North Coast and Sierra-Cascade Districts prior to the 1967 fire season. In addition, it is expected that equipment will soon be delivered to complete installation of microwave capability in Ranger Units of the Central Sierra District and a portion of the San Joaquin and Central Coast districts. The Division's VHF radio communication system now consists of more than 3,000 units, including base stations, mountain top mobile relays, handie-talkies, and mobile units.

In the 1966-67 fiscal year budget additional forest fire stations were established at Alturas, Modoc County; and Sunshine, near Mt. Diablo, in central Contra Costa County. These represented implementation of units which had been in the Division of Forestry's Fire Protection Plan for a number of years. During the 1966 fire season the Division of Forestry was budgeted to operate the following ground attack organization:

Forest Fire Stations	236
Forest Firetrucks	379
Bulldozer-Transport Units	{ 27 Large 31 Medium

This force was supplemented by the reinforcement and support strength of 151 16-man conservation camp crews from 37 conservation camps.

Air Attack Program

During 1966, the Division's Air Attack Program continued at essentially the same level as 1965: 25 light aircraft, 22 air tankers, and 5 helicopters under contract for standby and fire attack flying designated periods; this includes one air tanker and one helicopter for the Department of Water Resources Oroville Project. In addition, funds were budgeted for cooperative use of nine U.S. Forest Service contracted air tankers, some of which shared operating bases with the Division of Forestry. In 1966, the Division, in cooperation with the U.S. Forest Service, participated in new contractual understandings with air tanker operators, the results of a nationwide study by air tanker operators' associations and the U.S. Forest Service. Revised air tanker contracts established minimum guarantees for availability only, intended to return annual fixed costs to operators, with additional funds required for flight time. Division air tanker contracts were awarded through a competitive bidding process which established the hourly flight rate. During the 1966 fire season contracted aircraft were based at thirteen locations. In addition, our personnel assisted the U.S. Forest Service at two other bases which are of major interest for Division protection. During 1966, the last of our stock of short-term retardants was used, and our policy to use only long-term retardants went into full effect.

Watershed Fire Protection Planning

As part of its watershed fire protection planning efforts, the Division participated in three river basin studies: the Upper Eel River Study, and the Dry Creek Study in the North Coast; and the Central Lahontan River Basin Study on the east side of the Cen-

tral Sierras. These studies were in cooperation with other Federal and State agencies. During 1966, land treatment measures were initiated on the Escondido Creek Public Law 566 project in San Diego County.

In September, a representative attended a meeting in Eugene, Oregon, to receive training in the new method of sampling fires to determine timber damage. This is a result of the continuing effort of the National Association of State Foresters and the U.S. Forest Service to more firmly assess fire damages to the timber resource. Representatives from the states of Alaska, Washington, and Oregon were also present. The sampling area was located on the scene of the 46,500-acre Ox Bow Fire, southwest of Eugene.

Equipment Maintenance

The Division of Forestry operates a highly diversified fleet of automotive and heavy construction equipment, totaling 2,150 units. Maintenance and repair of this equipment are most important to efficiency of the Division's operations. During 1966, personnel from the State Forester's headquarters conducted the fourth annual training session for automotive maintenance personnel. In addition, substantial effort was spent in assisting with the training program for forestry equipment operators at the Southern California Training Center. Forestry equipment operators also are considered to be a key part of the Automotive Maintenance Program. In the 1966-67 fiscal year budget, four additional heavy equipment mechanics and one additional automotive maintenance foreman were financed. The mechanics will permit staffing of three additional Class A automotive repair shops at conservation camps.

The Division of Forestry participates as a member of the fire equipment committees of the California Rural Fire Association, and the National Fire Protection Association. To meet committee and Division needs, our representative on these committees has prepared a booklet entitled *Guidelines for the Design and Purchase of Rural Fire Apparatus*. This booklet is expected to be of substantial assistance to Division of Forestry unit managers in obtaining equipment to meet needs of contracted local government fire protection services, and has drawn much favorable comment from other fire services throughout the nation. In October, three Division of Forestry surplus forest firetrucks were sold to a volunteer fire department in the suburbs of Santiago, Chile. This transaction was completed as a part of the cooperative Chile-California Project.

Cooperation

The Division continued to enjoy close working relationships with the U.S. Forest Service. One evidence

of this is that six of the thirteen air tanker bases we operate were shared with the U.S. Forest Service. In addition, at several other air bases we planned for use of U.S. Forest Service-contracted aircraft for our initial attack. Contracts were continued with the U.S. Forest Service for protection of 5.2 million acres of State and private lands. During the year, a number of joint inspections by representatives from the State Forester's headquarters, Division District headquarters, and the U.S. Forest Service were conducted at the contracted facilities. A number of cooperative training sessions were sponsored by both agencies, including the Helitack Foreman School at Redding, and an Air Base Managers Workshop at Fresno. The Assistant Deputy from the San Joaquin District attended the U.S. Forest Service's National Fire Generalship School held in Marana, Arizona. Cooperative air tanker pilot training was also conducted. During the fire season, Division forces, primarily conservation camp crews, rendered assistance to the U.S. Forest Service on major fires.

In May 1966, a second major protection boundary change was agreed upon by the Division of Forestry and the Bureau of Land Management in the Lassen-Modoc Ranger Unit. This boundary change recognizes the developing capability of the Bureau of Land Management to protect its lands in the Honey Lake Grazing District. The lands transferred to Bureau of Land Management protection had previously been protected by the Division of Forestry on a fire cost reimbursement basis.

The counties of Kern, Los Angeles, Santa Barbara, Ventura, and Marin have maintained effective county fire departments for a number of years. In recognition of the duration of these departments and their capabilities, the Division contracts with them for protection of 4.2 million acres of State responsibility lands. The annual meeting of Division administrative personnel with the respective county fire chiefs was held in Monterey during July. This meeting provides for yearly discussion of mutual problems. During the past year, representatives from the responsible District headquarters and the State Forester's headquarters reviewed on the ground with separate county fire chiefs their administration of this contractual responsibility. In addition, during the past fire season, assistance was rendered to each of these counties in recognition of the State's responsibility to these areas.

During 1966, the Division cooperated with 26 counties to provide local government fire protection services on a contractual basis, cost of such services to be fully reimbursed to the State. The level of these services and intensity of protection varies with the wishes

of the local agency as specified in the particular contract. Total dollar level for various reimbursable services provided in 1966-67 is 5.4 million dollars. This is a partnership program between the State and local agencies of government; it endeavors to provide an effective, flexible, integrated fire protection service as economically as possible to those whom it serves; it takes advantage of the fact that the Division has an organization on the ground, a base from which it can expand to provide this local government service.

As one of several California fire service organizations that are statewide in nature, the Division of Forestry joined with other fire service organizations having similar statewide responsibilities to form the "California Fire Service Coordinating Council." Formation of this group recognizes that only by mutual agreement and united effort can the fire service do the greatest good for its members and the public that it serves.

Civil Defense and Disaster Responsibility

The Division of Forestry has civil defense responsibilities for fire, rescue, and radiological monitoring. In addition, an agreement with the Department of Water Resources provides for flood-fighting assistance. During the past year the Division of Forestry participated in one statewide civil defense exercise involving radiological monitoring reporting.

Liaison was maintained with State and local Disaster officials at the various levels of the organization. Division of Forestry Rangers in 23 Ranger units are Operational Area Mutual Aid Fire Coordinators, while three Division of Forestry District Deputies are Regional Mutual Aid Fire Coordinators.

External Relationships and Activities

In the interest of cooperation and fire protection, we have numerous contacts with many governmental and nongovernmental agencies at local, regional, state, and national levels. Each year Ranger Unit and District personnel participate in training sessions and pre-fire season meetings with other fire protection agencies, such as the U.S. Forest Service, cities, and fire districts, so that all are prepared to meet fire problems which frequently demand efforts of more than one responsible agency. Personnel from the Division of Forestry participated in the annual meeting of the California Rural Fire Association, and we are represented on the Board of Directors of this organization.

As a California fire service organization, Division personnel participate in meetings of firemen and fire chiefs at all levels. Contact is maintained with the of-

fice of the State Fire Marshal and the Pacific Fire Rating Bureau. Ranger Unit and District administrators have frequent occasion to meet with County Boards of Supervisors, County Planning Commissions, or other county officials to discuss fire protection problems that are of mutual concern. The Division has enjoyed a long period of close cooperation with the County Supervisors Association in connection with county-state fire protection contracts. In February, members of the State Forester's headquarters met with the Natural Resources Committee of the County Supervisors Association to discuss fire protection matters. Our personnel also attended regional meetings of this group. In Southern California, we participated in meetings of the Los Angeles County Watershed Commission and the Southern California Watershed Fire Council. These groups of interested citizens have done much to further fire protection in this section of the State and support the total fire protection needs of California.

In May, Division personnel met at the San Dimas Equipment Development Center with members of the California-Nevada Forest Fire Council. This group, a section of the Western Forest Fire Committee of the Western Forestry and Conservation Association, has served as a valuable forum for exchange of research and development information between governmental and nongovernmental groups; it has also furthered development of new research programs. During 1966, State Forester Raymond was chairman of this group. In December, Division representatives attended the annual meeting of the Western Forest Fire Committee and the Western Forestry and Conservation Association in Portland. The Division continued its long-established participation in the Forestry, Conservation Communications Association. During 1966, a Division representative was Western Regional Chairman of this group.

Forest Fire Management

The *Principles of Forest Fire Management*, first published by the Division in 1954, was revised and reissued in 1966 with a considerable amount of new material added. This publication has been particularly valuable over the years as a training and reference guide in firefighting techniques and organizational practices. In the revised edition, structure of the organization for managing forest fires has undergone major modifications. This is due partly to addition of aircraft to the attack forces. Also, increased use of large numbers of men and equipment from other agencies has shown the need for coordinating or liaison positions.

These reflect the increasing complexity of organizing for control of large fires in California. In 1966, substantial progress was made in preparing a companion publication to the *Principles of Forest Fire Management*,

entitled *Fire Control Handbook*. Intended as an instructional manual for fire managers, it is expected that this publication will be completed and distributed to its intended users in 1967.

RESEARCH AND DEVELOPMENT

Research and development play an important role in effective operation of Division of Forestry programs of forest protection and management. Coordinated research and timely development of new methods and equipment help the Division meet complex problems resulting from increased pressures and rapid changes in the use of California's wildland resources.

In carrying out its research and development projects, the Division allocates funds by cooperative agreement to agencies equipped to engage in scientific research. Research projects were continued during the year in several different areas of inquiry.

Fire Research

Cooperation was continued with a large number of other agencies, both public and private, in conducting research. The Division contracted directly with the U.S. Forest Service's Pacific Southwest Forest and Range Experiment Station for cooperative research in Fire Climate, Fire Control Tactics, and Hazard Reduction studies. Money was also contracted to the University of California's School of Forestry for a continuing study of the Economics of Fire Protection. As a part of this study, mathematical models are being prepared simulating use of air tankers and other tools on wildland fires. Most significant in 1966 was development of techniques for night use of helicopters on forest fires, which will permit actual placement of men and supplies on the fire line during hours of darkness—a technique not previously possible. A study was also started to determine rates of line construction by hand crews on the fire line, which will provide better information for tactical planning by the fire boss. Inspection for quality control of retardant mixing operations of air attack bases continued. The Division is purchasing for evaluation a prototype remote fire weather observing station. This unit will report temperature, humidity, fuel moisture, wind direction and wind speed on a programmed basis every two hours, or when interrogated on call. This prototype will be tested in conjunction with the newly installed Department of Water Resources North Coast telemetering system, sometime in 1967. As part of a continuing effort to develop better firefighting equipment and to meet changing fire protection problems, a new

model firetruck was constructed in the Davis Shop; it was subsequently reviewed and critiqued by Division personnel in each of the six Districts. This new tilt-cab unit embodies both water tanker and firetruck capabilities, carrying three men and 1200 gallons of water. It is equipped with a 500 gallon per minute midship pump and an 85 gallon per minute auxiliary, engine-driven pump. The unit will be field tested in a Ranger Unit during the 1967 fire season. In addition, 25 air attack base retardant transfer pumps mounted to power units were manufactured at the Davis Shop. During 1966, data collection and analysis continued on the Division's fire replanning effort. Final recommendations of the Air Attack Committee and the administrative Districts regarding air attack needs were completed and submitted to the State Forester's headquarters for review. It is expected this planning effort will be completed during 1967.

Fire Prevention

In a previously selected "test community," studies continuing during the year supplied information which showed great promise of preventing fires when applied to other areas throughout the State. Surprising to many was the fact little resentment was found to inspection of properties and rigid enforcement of fire prevention laws.

Contracts were let for additional research in the test community related to effectiveness of fire prevention signs; information on "children and matches" fires; and attitudes and knowledge of Division of Forestry employees working in the field of fire prevention.

An important new project in 1966 was research into sociological aspects of fires caused by "children with matches." The contract has been awarded to George Washington University. The research will include an in-depth study of a representative sample of both wildland and urban fires started by children. Hopefully, this project will lead to methods of reducing the current level of fires from this cause—20 percent of all man-caused fires in State responsibility areas.

Inventory of Wildland Soil and Vegetation

This inventory is being carried out cooperatively with the Pacific Southwest Forest and Range Experiment Station and the University of California. During

1966, a total of 332,000 acres in Yuba, Butte, and Calaveras counties was completed; two soil vegetation quadrangle maps from Shasta County were printed and made available for purchase. During 1967, we will continue field mapping in Butte and Calaveras counties (Yuba County has been completed); continue publishing maps and reports of the Shasta County survey; and begin publishing maps and reports of the Sonoma



Since the inventory began in 1947, soils and vegetation of more than eight million acres of wildlands in northern California have been mapped in detail.

County survey. Since this inventory began in 1947, the soils and vegetation of over eight million acres of privately owned wildlands have been mapped within the area of Division of Forestry fire protection responsibility in Northern California.

Watershed Management Research

Natural relationships among vegetation, soil, and water, and the functioning of brush-covered mountains as watersheds have been subjects of investigation at San Dimas Experimental Forest of the Pacific Southwest Forest and Range Experiment Station. Division of Forestry financial support to studies of applied watershed management was continued during 1966, with emphasis given to studies of brushland flood and sedimentation reduction, and water yield improvement.

Forest Management Research

The School of Forestry of the University of California, largely on behalf of the Division of Forestry, is conducting a number of important small-scale research projects having application to several Division programs. During 1966, support was continued for these projects: tree planting stock physiology; seed tree effectiveness; forest growth prediction; California hardwood utilization; forest rodents; dwarf mistletoe; gall rust; and bark beetles. A significant finding this year in investigation of population dynamics of bark beetle populations was isolation of a sex attractant which may be useful in controlling beetle epidemics.

FOREST, RANGE, AND WATERSHED MANAGEMENT

State Forests

Eight State Forests with 70,238 acres of representative California timber types are managed by the Division. These multiple-use forests are managed for timber, Christmas trees, water, recreation and other uses, but perhaps most important they provide a laboratory for demonstration and experimentation of forest land management. Management of the four largest forests, of approximately 69,000 acres, is accomplished through a staff of professional foresters.

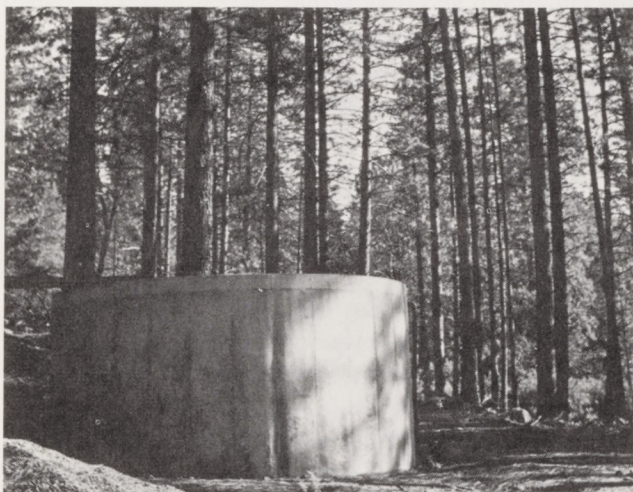
In a program of harvesting mature timber and maintaining continuous production, 1966 operations produced 31,715,447 board feet of timber, and 9,674 Christmas trees and miscellaneous products, with a combined value of \$860,282. Cumulative receipts transferred into the State's General Fund 1946-66 have amounted to \$8,315,641. Counties in which forests are located received \$42,829 of in-lieu property taxes for

1965-66, and a total of \$522,829 since the forests were acquired by the State.

The volume of timber harvested continues to advance along with an allowable cut increase which is based on more rapid growth, better inventory, improved utilization, and more foresters to prepare and supervise sales. The first remeasurement of the continuous forest inventory on Jackson State Forest was completed and data submitted for electronic data processing. Also, fieldwork has been completed on the Latour State Forest continuous forest inventory, which is being programmed for electronic data processing.

In response to an increased allowable cut of 7.5 million board feet on Jackson State Forest, and the fact that sales management of young-growth timber increases the workload considerably, three additional foresters and one clerk position were approved in the 1966-67 budget.

Recreation planning, development, and maintenance continue on the forests. Considerable effort was expended at the Mendocino Woodlands recreation area on Jackson State Forest in maintaining sewers and reworking electrical circuits to improve the recreation facilities used by hundreds of Bay Area children each year. A comprehensive recreation plan was completed for Boggs Mountain State Forest, along with some development. Conservation camp crews spent about 30,000 man hours on road, trail, and water development at Boggs Mountain. Mountain Home State Forest continued to have heavy recreation use, exemplified by the 4,000 people who walked the forest's self-guiding forest trail.



Big Springs water storage tank, Boggs Mountain State Forest. One of two 10,000-gallon storage tanks on the Forest, constructed by crews from Konocti Conservation Camp. It stores water for the dual purposes of fire control and recreation use.

A severe storm that dropped about 28 inches of rain during a two-day period caused some serious damage at Mountain Home. Roads suffered extensive damage in a few places; Shake Camp campground was severely scoured, and the entrance structure at Haughton Cave was buried under five feet of silt and debris. Considering the intensity of the storm, overall damage was at a minimum, which is a tribute to the land management techniques in use on the forest.

Latour State Forest's difficult problem of maintaining road surfaces is partially solved with a 4,000 cubic yard inventory of crushed rock stockpiled this year for road surfacing in 1967. The Christmas tree management program showed progress at Latour, with the removal of 8,000 trees, plans for additional demonstration, and experimentation with cultural techniques. Experimental work in Sierra redwood Christmas trees was

continued at Mountain Home along with the harvest of 50 additional redwood trees.

Progress continues on Jackson's Caspar Creek Watershed Study with location of an access road in the South Fork, to be constructed in 1967, with effects on the watershed to be evaluated in succeeding years. It was interesting to note that in January 1966, flows through the weirs exceeded the heavy December 1964 floods but with very little adverse effects. Some 1,500 yards of silt and debris that accumulated since the dam was constructed in 1961 were removed from the upstream side of the South Fork weir during the summer of 1966.

Other experiments worked on in 1966 included: Caspar Creek regeneration cutting trials and grass seeding for erosion control on Jackson State Forest; *Fomes annosus* root rot studies on Boggs Mountain State Forest; chemical control of vegetation, tree seeding techniques, and Sierra redwood Christmas tree culture on Mountain Home State Forest; and plantation timing and culture, and broadcast seeding on Latour State Forest.

Preparations have been made to conduct further experimental scaling by weighing truck loads of logs in 1967 on Jackson State Forest. This test should supply valuable information on use of this method of measurement, which appears to be especially adaptable to sound second-growth timber. The timber sale to begin on Mountain Home in 1967 will be the largest in that Forest's history: 5,583,000 board feet, with a value of \$75,000. Jackson State Forest sales will amount to approximately 25,000,000 board feet in 1967. These sales, plus those from Latour and Boggs Mountain State Forests, indicate above average production for 1967.

As in the past, conservation camp crews supplied labor for the considerable hazard reduction, road construction, maintenance, and for much experimental work accomplished on all forests.

Forest Practice Act

Much public interest was focused on the Forest Practice Act in 1966. District forest practice rules, formulated under the Forest Practice Act, regulate timber harvesting on private lands in California. Regulated harvesting is to conserve and maintain productivity of timberlands in private ownership, for the economic welfare of the State and continuance of the forest industry. The State Forester administers the Forest Practice Act under policies adopted by the Board of Forestry. Division personnel make periodic inspections of timber operations to determine and re-

quire compliance with district rules and the Forest Act.

Upon determination by the State Forester, in September 1965, that forest practice rules should be amended, the Board of Forestry ordered district Forest Practice Committees to review district rules to determine their adequacy for present conditions. In the fall of 1965, the Committees began a study of their rules. Several public meetings were held by committees during 1966 to review present rules; and to give timber owners, timber operators, and others an opportunity to recommend amendments. Many suggestions were received concerning rules for harvesting methods, stream protection, and erosion control practices. Several field trips were called by the Department of Fish and Game, and the timber industry, to examine problems along streams. Committee and Division personnel participated in these tours.

Several changes occurred in membership of the various Forest Practice Committees during the year.

In June, the State Board of Forestry made an intensive four-day study of forestry in the redwood region. Observations were made of areas logged prior to the Forest Practice Act; areas logged under the basic rules for the Redwood Forest District; and areas harvested under "alternate plans" approved by the



Board of Forestry members and others discuss relogging of private lands originally logged under provisions of the Forest Practice Rules.

Board. The Board found that "... no single formula can be developed to fit all the complex situations encountered in the practice of forestry in the Redwood Region. The Redwood Region is quite unique in its ability to produce and continue to produce forest crops. Current management plans of major companies

indicate a sound future for the privately owned forest of the area."

The Assembly Committee on Natural Resources, Planning, and Public Works, Subcommittee on Forest Practices and Watershed Management, held a public hearing in Berkeley, on August 17, devoted to the Forest Practice Act and watershed management. The State Forester submitted a comprehensive report to the Committee on administration of the Forest Practice Act and its relation to other land uses. The Sierra Club and other conservation organizations are actively promoting more intensive state regulation of private logging. For two days following the hearing, the Committee toured the redwood area to observe logging conditions and park problems.

In 1966, the State Forester issued 275 original timber operator permits and renewed 998 permits, collecting \$15,080 in license fees. Some 2,000 notices were filed by timber owners and operators notifying the State Forester of proposed timber operations. Operators reported cutting 5.27 billion board feet of timber in 1965—about 205 million board feet less than was cut in 1964.

The Division, in 1966, made 1,777 forest practice inspections. Statewide, 94 percent of all rules inspected for were found to be in compliance, compared with 91 percent in 1965. In 1966, Division inspection showed overall compliance with the rules in the North and South Sierra Pine Forest Districts was 96 and 95 percent, respectively. There was 93 percent compliance in the Redwood Forest District, and 91 percent compliance in the Coast Range Pine and Fir Forest District. Inspectors observed 780 infractions of the rules in 1966, compared with 1,023 in 1965. Deficiencies were found most frequently in compliance with rules on snag disposal, fire plan, erosion control, and slash disposal requirements.

Most law enforcement in 1966 was accomplished through administrative action. The Division sent timber operators 577 violation notices. In addition, many letters and followup meetings were held with operators to improve compliance with rules. Over half the areas where repeat inspections were made showed ultimate full compliance with the rules. Eleven cases were filed with the State Forester for denial of timber operator's permit in 1966 for failure to correct rule violations. Four of these operators corrected violations. Two cases developed into further litigation for suspension or revocation of their permit. Five operators, including one who made substantial correction, discontinued timber operations. They will be denied permits until their violations are corrected.

Affidavits to devote 13,943 acres of timberland to purposes other than growing timber were filed in 1966 by 36 owners. About 84 percent of this acreage was declared by the owners to be for the purpose of improving grazing while the balance was for mining, construction, or urban development projects.

The Board of Forestry approved 16 alternate plans in 1966. Fifteen of these plans were in the Redwood and Coast Range Forest districts, involving harvesting mature merchantable timber followed by prompt seeding or planting to restock cutover land as soon as possible. One plan provided for intensive Christmas tree management in the North Sierra Forest District. Three alternate plans terminated in 1966, leaving 66 plans still active at the close of the year.

Forest Practice Committee hearings will be continued in 1967 to make necessary amendments to district rules. The Division inspection program will be intensified. New enforcement features of the Act are to be tested to determine their effectiveness on operators who terminate operations without correcting violations.

Service Forestry

During 1966, the Division employed ten Service Foresters to assist landowners with their many and varied problems of forest land management in California. The foresters help landowners solve problems of timber stand improvement, forest reproduction, protection from forest insects and diseases, marketing, and



Timber harvesting under improved management in Shasta County. This 50-year-old ponderosa pine stand was subjected to a light harvest cut to provide income, and increase growth on undamaged residual trees.

many other phases of land and timber management. They also assist numerous owners with management

problems on several million acres of noncommercial forest land.

Service Foresters are headquartered in Fortuna, Willits, Santa Rosa, Redding, Oroville, Camino, Sacramento, Fresno, Monterey, and Riverside. An additional position, tentatively assigned at Yreka, received budget approval in 1966.

During 1966, California's Service Foresters received 2,377 requests for assistance—43 percent more requests per man for assistance than the nationwide average. More than 2,000 owners were given professional assistance or advice, on 264,000 acres of forest land.



Effective tree farming in Amador County. Mature old-growth timber was logged from this area ten years ago. Trees in the background were left undamaged—are now merchantable. Rapidly developing third crop in evidence around the old stump.

These owners had more than four million dollars in gross returns from their accomplishments under improved forestry practices. While this is only a small portion of the State's forestry income, it is significant since the value of timber increases 25 times between the stump and delivery of finished products to final consumers.

As land use continues to become more intensive, Service Foresters become increasingly involved in some nontimber aspects of forest ownership. They assisted more than 400 cooperators with problems of recreation, special forest products, water management, and wildlife management.

The Division's foresters represented the U.S. Forest Service in providing technical assistance in determining feasibility and completion for reforestation and timber stand improvement practices under the U.S. Government's Agricultural Conservation Program.

Under the cooperative Forest Management Act of 1950, the U.S. Forest Service reimburses about 30 percent of the cost of the service forestry program in California. Due to a 1966 change in the allotment formula, and the fact that California has 30,000 small owners on 3.5 million acres of commercial forest land, the amount of reimbursement is expected to increase annually for some time.

Nursery and Reforestation

The Division produces tree planting stock for forests, farm windbreaks, erosion control, and public land beautification. It maintains four nurseries in Northern California for this purpose. It is also responsible for conducting reforestation studies on State Forests, and through cooperative agreements with private landowners, for developing improved reforestation methods.

Seed procurement is an important part of the program. Supplies of good Douglas fir seed for the nurseries and reforestation studies were nearly exhausted in early 1966; however, a bumper cone crop in Humboldt and Del Norte Counties in the fall provided seed to replenish the stock. Over 264 sacks of cones collected by private individuals and conservation camp inmate crews yielded 194 pounds of clean seed. Cone crops of other timber species in California forests were failures, except for Monterey pine in the central coast area. Conservation camp crews collected 595 sacks of this species which produced 475 pounds of seed.

The nurseries annual seedling production increased by 253,000 trees; 3,165,000 seedlings were distributed. The 50 percent price increase, effective at the beginning of the 1965-66 season, had no apparent adverse influence on demand. It was even necessary to purchase 238,000 Douglas fir seedlings from one of the U.S. Forest Service nurseries to augment the Division's production. Approximately 3,186,000 seedlings will be available for the 1966-67 season.

Division and U.S. Forest Service nursery personnel sponsored the 10th biennial meeting of the Western Forest Nursery Council held at Placerville, El Dorado

County, and Davis, Yolo County, in mid-August. Council membership is made up of forest nursery and reforestation experts from 12 western states and British Columbia.

Reforestation activities on private land increased, particularly seeding to regenerate areas logged by clear-cutting, an approved alternative to the Forest Practice regulations. Reforestation by seeding and planting amounted to 13,486 acres, of which 8,166 acres were seeded. This placed California fourth among the 24 states recording seeding activities, and 19th among 46 in total reforestation work. This compares with seventh and 21st, respectively, recorded the previous year.

The 10-man Advisory Committee to the State Forester on Reforestation Methods and Procedures met in the field in June and October. The June meeting was held jointly with the State Board of Forestry. Results of seeding as a means to regenerate clearcut logged areas in Northwestern California were observed. Based on these observations, the Committee concluded that on medium and better commercial sites of the Northern Redwood Region regeneration is seldom a problem under present forest management practices; and that additional studies are needed to develop more economical reforestation techniques for adverse and problem sites.

The October field trip in Yuba County was conducted by personnel of Challenge Experimental Forest, Pacific Southwest Forest & Range Experiment Station, and Soper-Wheeler Corporation. Clearcut logging of young-growth ponderosa pine, followed by aerial seeding with the same species, appears to be a suitable practice to obtain adequate regeneration on the Ex-



Reforestation Advisory Committee discusses regeneration from broadcast seeding a 30-acre clearcut block of ponderosa pine on Challenge Experimental Forest, Yuba County.

perimental Forest. Soper-Wheeler Corporation employs hand seed-spotting and planting seedlings to successfully regenerate its poorly stocked lands.

Reforestation studies on State Forests, at Division administrative sites, and on private land included: comparison of machine and broadcast seeding on non-stocked forest land; laboratory tests to determine the physiological condition of white fir seedlings receiving several storage treatments; controlled pollination of three species of pines to produce improved hybrid seedlings; and several planting trials to test improved methods of handling seedlings. Most of these studies will be continued in 1967.



Measuring rapid growth of a Monterey pine—nearly six feet a year—in a Division of Forestry experimental plantation near Ben Lomond Youth Conservation Camp, Santa Cruz County.

Forest Pest Control

Objectives of forest pest control are to detect, appraise, and control damage to forest trees from insects, disease, and animals. Surveys are made to detect forest pest damage, and to determine its cause and extent. Action is taken to control insect epidemics and disease infection centers on State and private lands within "zones of infestation" established by the State Board of Forestry. Control activities are undertaken in co-

operation with landowners; where federal lands are threatened, the U.S. Forest Service may cooperate.

Defoliators, a major insect problem for the past three years, were reduced to endemic conditions. The last infestation of Douglas fir tussock moth died out in the northeastern section of the State due to a virus, and a heavy frost killing the new growth of needles.



White fir killed and damaged by tussock moth at Knox Mountain, Modoc County. Epidemic collapsed following control project by the Division of Forestry in 1965.

Bark beetle activity increased during the year. New infestations of Jeffrey pine and Douglas fir bark beetles accounted for killing 200 million board feet in Northern California. The Division participated in eight direct control bark beetle projects, treating 2,766 trees. The European pine shoot moth was found in California for the first time, but is now believed to be eradicated.

Forest disease conditions changed very slightly in 1966. A new disease, red band needle blight, attacking Monterey pine plantations along the north coast, was reported for the first time in California. New locations of root rots were reported. Conservation camp crews were used on blister rust control projects in Modoc, Lassen, Butte, and Tehama Counties. They eradicated gooseberries (*Ribes* spp.), the alternate host for blister rust, on 1,553 acres.

Deer depredation continues to be the most extensive animal damage that is reported.

The California Forest Pest Action Council, at its annual meeting, passed a number of resolutions concerning forest pest problems. They opposed legislation which would prohibit sale and use of DDT. The Council supported the concept of private contracts for treatment of bark beetle trees. The U.S. Bureau of Sport Fisheries and Wildlife was urged to reactivate forest animal research in California as soon as possible. They favored expanding research to find suitable

materials and techniques for protecting forest tree seed from rodents in reforestation projects. The Legislature was requested to revise present laws for issuing deer depredation permits; and the University of California Extension Service was asked to appoint a specialist in forest diseases to assist with disease problems.

Plans for the forthcoming year are to begin additional projects for direct control of bark beetles, due to increased activity. A lower level of incidence of blister rust makes it possible to defer all control projects for this disease south of Interstate 80.

Timber Taxation

During 1966, the Board of Equalization and the County Assessors began to implement and administer Chapter 1847 of the Revenue and Taxation Code, as amended by the Legislature in 1965. This new law more specifically directs administration of Section 12 $\frac{3}{4}$ of the State Constitution in determining exemption and maturity of young-growth timber.

The amended law requires Timber Maturity Boards to inspect and determine maturity of young-growth timber for tax purposes at the end of the 40-year exemption period after cutting, as prescribed in the Constitution. The law also requires filing affidavits by timber owners for tax exemption of young-growth timber. The majority of timber owners with substantial holdings of cutover or young-growth timber filed affidavits during 1966.

County Assessors have been checking and cataloguing data from these affidavits preparatory to Maturity Board hearings on young-growth parcels cut over more than 40 years ago. Maturity Boards have a large backlog of work to reach a current basis of considering annually the timber ownerships where 40 years have passed since cutting. Catching up with this backlog will take at least two years. Maintaining a current annual status in the timber counties thereafter will require further substantial effort from Maturity Boards.

The State Forester budgeted a new Forester III staff position—approved and filled July 1, 1966—to assist in Division of Forestry administration of Timber Maturity under Article 12 $\frac{3}{4}$ of the Constitution, including assistance to Board of Forestry members serving on Timber Maturity Boards in field examinations, and Timber Maturity Board actions.

At least three County Assessors have filled new positions of timber appraisers on their staffs, and two other counties are trying to fill similar positions.

As a result of the new legislation and its implementation, declaration of maturity of young-growth tim-

ber increased sharply in 1966 over 1965, tabulated as follows:

Timber Maturity Declarations Made in 1966

County	No. of Properties	No. of Acres
Lassen	2	16,400
Siskiyou	3	15,554
Shasta	4	1,195
Humboldt	85	36,478
Mendocino	2	352
Del Norte	47	401
Totals	143	70,380

At the end of 1966, the cumulative total, statewide, was 376,162 acres of timber declared mature on 878 properties.

As additional affidavits for exemption of young-growth timber are filed, and assessors of timber counties continue to catalog young-growth timber properties, Maturity Board activity can be expected to show a further increase in 1967.

Brush Range Improvement

The brush range improvement program has as its objectives improving forage production on brush-covered lands, fire prevention and protection, and watershed protection and conservation. The Division of Forestry is authorized to administer permits for controlled burning of brush; to give advisory services to prevent damage to property of others due to such burning; and to provide standby fire protection, to the extent that facilities are available.

As in prior years since 1945, private landowners used fire in clearing 58,588 acres of brush range land in the State during 1966. Two hundred twenty-seven applications were received, which proposed burning 88,701 acres of brush-covered land for range improvement; 201 permits were issued. These permittees conducted 154 controlled burns; 18 were cooperative projects involving two or more adjacent landowners. Regular Division fire control forces stood by in the event a fire escaped during burning of 31,684 acres, on 45 separate burning projects.

Activity in the brush range improvement program was down this year, with several burns being conducted late in the season after a very slow spring and summer. Many ranchers were reluctant to burn early in the season because of the short forage supply resulting from a record spring drought. Since inception of this program in 1945, about 1.82 million acres of low quality forage have been treated with fire on California brush lands, not including repeat burning of some areas.

The trend in this program is toward an increase in number of controlled burns which are reburns for one or more times. During 1966, 31,378 acres were reburned, with 6,981 acres treated mechanically prior to burning; 16,423 acres were seeded to range grass mixtures. Each year much effort is placed on controlled burning for wild game management—24 permit burns were conducted exclusively for game habitat improvement on 3,940 acres. An additional 10,000 acres were controlled burned for multiple-use purposes, including both domestic livestock grazing and wildlife habitat improvement this past season.

Division range specialists provided advisory service to more than 400 landowners. Range improvement measures recommended included mechanical preparation, followup seeding, and chemical sprout control used in combination with fire for land clearing. These specialists also attended many meetings of local range improvement associations; conducted and attended range improvement tours; and spoke on range improvement practices to rancher and civic groups. In addition to these activities, these specialists reviewed public watershed development and protection projects, and conducted a program of brush hazard reduction on Division of Forestry fuelbreaks.

The Division of Forestry continues to engage in a program of range field studies to gain new knowledge and develop new range practices. Findings from those studies are published from time to time in a series of publications entitled *Range Improvement Studies*. The Division's goal in this program is to have at least one long range study in progress in each district, in cooperation with other agencies and private landowners. The range improvement field studies are authorized under Sections 4771-4776 and 4781-4788, Public Resources Code.

Emergency Revegetation

The Emergency Revegetation Program is authorized under Section 4675 of the Public Resources Code. It provides for seeding burned-over watershed lands to establish an emergency cover of protective vegetation for preventing soil erosion, flooding, and downstream sedimentation detrimental to public health and welfare.

During the 1966 fire season two major fires burning on both public and private land, and one fire solely on private land, required treatment under the cooperative emergency revegetation program. In addition, one fire which occurred late in the 1965 season was seeded in March 1966. A total of 3,889 acres was treated under the emergency revegetation program during 1966 (table 1).

Table 1. Emergency Revegetation Activity in 1966

Fire	Date	Total Acres	Public Lands	Private Land	
				Lands	Acres Seeded
Jim	11-1-65	980	680	300	300
Round	8-7-66	20,534	15,258	5,276	2,840
Loop	11-1-66	2,125	1,468	657	470
Rocketdyne	11-1-66	301	-0-	301	279
		23,940	17,406	6,534	3,889

The "Round Fire" in Lake County burned over 20,534 acres of federal and private land in and near Mendocino National Forest. Seeding was required on 11,488 acres of watershed land burned by this fire, including 2,840 acres of private land owned by the Fibreboard Corporation. Seeding, contracted to the U.S. Forest Service for approximately \$1.25 per acre, called for sowing annual ryegrass (*Lolium multiflorum*) at the rate of eight pounds per acre, for erosion control measures. Costs of seeding this 2,840 acres were shared equally by the State and Fibreboard Corporation, while the U.S. Forest Service paid the entire cost of seeding the 8,648 acres of public land.



Helispot loading area for seeding on Round Mountain Burn, Lake County, at Howard Mill Site. Seeding the private lands in this burn was a Division of Forestry emergency revegetation project.

Two fires in Los Angeles County required treatment. The "Loop Fire" blackened 1,468 acres of public land and 657 acres of private land. The State and Los Angeles County cooperatively seeded 470 acres of the burned private land; the U.S. Forest Service seeded 1,340 acres of public land as a separate project. The "Rocketdyne Fire" burned 300 acres of critical watershed, all on private land, before being brought under control. It was determined necessary to treat 270 acres of this burned area to prevent excessive erosion and flooding. Thus, a total of 749 acres burned by these two fires was seeded cooperatively by the Division of Forestry and Los Angeles County. The County did

the seeding under contract, sowing eight pounds of ryegrass per acre at a cost of \$1.26.

The "Jim Fire," in Riverside County, occurred in October 1965; however, due to unfavorable weather conditions, it was not seeded until March 1966. The Division of Forestry and Riverside County Flood Control District shared equally the cost of treating 300 acres of private land; and 645 acres of public land were treated at U.S. Forest Service expense. A total of 945 acres of public and private land were seeded co-operatively, using annual ryegrass at eight pounds per acre. The cost of seeding was \$1.51 per acre.



Helicopter seeding area burned by the Jim Fire, Riverside County. A Division of Forestry emergency revegetation project was established to provide protective cover for valuable watershed lands.

FIRE PREVENTION EDUCATION

Fire Prevention Activities

The year 1966 witnessed increases in on-the-ground application of fire prevention activities, some of them in the planning stages for more than five years. Measures delineated in the fire prevention section of the State Forester's Fire Protection Plan, authorized by fire prevention laws enacted in 1963, were partly funded for fiscal year 1966-67.

By mid-January, job descriptions and duty statements had been prepared for a new personnel class known as the Fire Prevention Series, to implement an increased prevention effort, called "Project Fire Prevention." The new category of employment includes Fire Prevention Officers I through V; Fire Prevention Officers I are responsible for on-the-ground fire prevention measures; and Fire Prevention Officers V for program development and administration in a particular facet of the total effort. Project Fire Prevention encompasses a broad field which includes: Education and Information, Fire Prevention Engineering, Civil Law Administration, Criminal Law Enforcement, and Research.

For many years, the number of man-caused forest fires per 100 thousand population has been rather constant at 17 plus. Nonforest fires in forest and wildland areas—structures, vehicles, and so forth—have been increasing faster than population, reflecting greatly increased use of wildlands in recent years (fig. 2 and table 2).

Studies show that a balanced combination of education and engineering, coupled with judicious administration of the law, can reduce fire incidence. The goal for the next decade, with adequate financing of Project

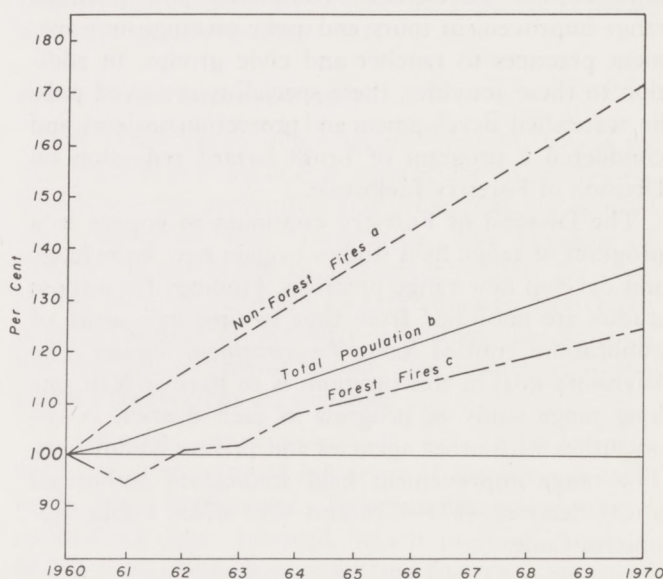


Fig. 2. Comparative growth rates of population and fires in wildlands (five-year moving averages). State responsibility areas, direct protection area of the California Division of Forestry.

Notes—

- Nonforest Fires—refuse, improvement, structural, and vehicle—in forest and wildland areas: increasing at the rate of 7.24 percent per year.
- Total Population: increasing at the rate of 3.6 percent per year (2.6 percent for 1966 only). Source: Department of Finance, *California Population, 1966*.
- Forest Fires—timber, brush, and watershed fires in wildlands, but not including nonforest fires described in note a: increasing at the rate of 2.36 percent per year.

Fire Prevention, is a reduction of man-caused forest fires from the current 17 per 100 thousand to 6 per 100 thousand of the State's population. Even greater reductions are possible in the nonforest fires in forested areas.

Table 2. Comparative growth of California's population, and fire occurrence in wildlands; State responsibility areas, direct protection area of the California Division of Forestry.

	1960	1964	1970 (5-year moving means) (Projected)
Total population ^a	15,877,800	18,200,600	21,643,000
Nonforest fires in			
wildlands ^b	1,806	2,330	3,100
Forest fires	3,041	3,328	3,750

^a Source: Calif. Dept. of Finance, *California Population*, 1966.

^b Refuse, improvement, structural, and vehicle fires in forest and wildland areas.

Education and Information

In late April and early May, meetings of the California Fire Prevention Committee were held in San Francisco and Los Angeles to prepare for saturation fire prevention educational activities by companies, agencies, utilities, and news media comprising this 400-member organization. This and other cooperative fire prevention education activities resulted in distribution of some 3.5 million pieces of educational material.

During the "long, hot summer" fire danger warnings were included in Weather Bureau forecasts; were featured on radio and television newscasts; and were a major part of the public service activities of all the media. A dozen major news releases from the Governor's Office reported the critical situation in forest areas; they called for extra precautions while working or recreating in fire-hazardous areas.

An award-winning 42-minute color education film, *Never the Easy Way*, was produced and made available to 31 television stations and 372 theaters. Television spot announcements were also produced which had wide distribution.

Fire Prevention Engineering

An improved level of compliance was noted in clearance of vegetation from electrical power structures, required by statutes enacted in 1963. An estimated \$5 million has been spent by the larger utility companies for this work. In addition, one major company has instituted a "no-test" procedure based on the fire danger rating. During critical periods, when power outages occur, lines are not recharged until visual inspection is made to determine if a forest fire could be started by introduction of current. In one instance, a complete circuit was without power for 8½ hours pending assurance of fire safety.

Inspections of properties for compliance with fire laws increased, but the most significant development was introduction of an inspection report, Form LE-38,

designed for optical scanning and automatic data processing.

The State Forester issued 358 rubbish dump permits in 1966. Added to still valid permits issued in 1965, the total is 483 rubbish dumps now under permit in the State. A large number of private dumps still operate without permit due to shortage of inspection personnel to enforce the law.

Criminal and Civil Law Enforcement

1966 was a year of continuing change and improvement as the Division bolstered its capabilities in fire law enforcement. Basic peace officer training was continued to provide a minimum of 200 hours of training per man for more than 400 peace officers now employed. A pilot course in peace officer training for administrators was completed in May 1966; plans were prepared for instruction of 180 officers in the next three years.

A new series of identification cards for voluntary firewardens and peace officers was issued; they provide for positive identification of the officer. A badge was designed for the Arson Investigation Unit.

A proposed uniform bail schedule for State fire law violations was developed and distributed. Initial acceptance by courts has been encouraging. In many courts, bail for both misdemeanor and felony fire law violations has been increased, reflecting a greater concern over the increasing number of violations and the relative seriousness of these crimes.

Significant legislation was passed with regard to arson in 1966. Fire bombs were defined; their possession and use made a felony. Assault and battery against a fireman was made a felony. The willful setting of grass and brush fires, while previously a felony, was moved from the malicious mischief statutes into the arson statutes. A "fireman" was defined by statute.

The number of misdemeanor cases completed during the year was 433, a significant increase. There was a two fold increase in the number of felony convictions—71 convictions were obtained.

Efforts to recover fire suppression costs were increased—in both number of cases and dollar amounts—where justification existed. Fewer cases were closed in 1966 than in 1965, because of the number involving large amounts of money which are awaiting court action. Some \$89,000 of fire suppression costs was collected; outstanding claims total about \$900,000.

Plans for 1967

Appointment of a Fire Prevention Officer V to head fire prevention research activities is planned for early 1967. In addition, four other Fire Prevention Officers

V will be appointed to give leadership to the other statewide fire prevention activities. Field Fire Preven-

tion Officers will be assigned to plan and extend activities now being carried on.

MANAGEMENT SERVICES

Managerial Processes and Budget Planning

The Management Services Section assists the Executive Office in carrying out managerial processes. Major responsibilities are to gather and analyze data, identify premises, and evaluate alternatives for the budget planning function; and to provide the Executive Office support and assistance in developing and maintaining a personnel management information system. The goal of this system is maximum utilization of manpower resources. Management Services also is charged with the duty of providing guidance and assistance to the entire organization in functions of purchasing and warehousing supplies and equipment; records and office management; and property management.

Early in the year it became evident that the executive staff would be required to assist with development of a programming and budgeting system to be adopted by the State of California by July 1968. Substantial progress has been made. At the close of the year we were working with the following identified programs:

Land Use:

- Forest Pest Protection
- Reforestation and Forest Nurseries
- Wildland Soil and Watershed Management

- Brushland Range Advisory Service
- Forest Practice Regulation
- Forest Advisory Services
- Management Demonstrations on State Forests

Fire Protection:

- Fire Prevention
- Fire Control State Responsible Areas

Conservation Camps

Civil Defense and Other Nonfire Emergencies

Administration

It is anticipated that progress will continue in developing the system. Our goal for 1967 is to test effectiveness of our evolving system in aiding the Executive Office in the decision making process.

In addition, it is our goal to identify elements and components of acceptable programs to further aid in the decision making process. It is believed that during 1967 we can make progress in developing a "cost accumulation" system to facilitate cost effectiveness studies. During 1967, we will also introduce the concept of multiyear programming. We are summarizing below the Division of Forestry budget for fiscal year 1966-67 by object of expenditure:

DIVISION OF FORESTRY BUDGET—Fiscal Year 1966-67

(1) GENERAL SUPPORT (Excluding Emergency Fire)	\$29,944,773
(2) FOR OTHER AGENCIES (Protecting State and Private State Responsibility Land)	3,857,976
(3) EMERGENCY FIRE FUND	1,300,000
(4) BLISTER RUST CONTROL	70,000
(5) INSECT CONTROL	36,000
(6) FOREST AND FIRE RESEARCH	339,779
(7) TOTAL ABOVE	\$35,548,728
(8) CAPITAL OUTLAY	\$9,078,174

Explanation of above budget:

- (1) The Support Budget for the Division of Forestry was increased approximately \$2,689,018 over the 1965-66 fiscal year level. Increases are attributable to the following:

- (a) July 1, 1966, salary increase \$901,030.
- (b) The Legislature recognized the need for a greater effort in fire prevention and augmented the Division's budget by \$442,337.
- (c) Conservation Camp activations and expansions \$332,093.
- (d) Equipment allocation was increased approximately \$328,000. Of this sum \$278,000 was utilized in meeting replacement needs; \$50,000 was used for purchase of additional specialized fire equipment.

- (e) Alturas and Sunshine Forest Fire Stations were established in 1966-67 fiscal year; \$103,920 was appropriated by the Legislature for this purpose. This does not represent the total recurring cost as Alturas Station was funded for only three months of the 67 fiscal year.

- (f) Bulldozer crew units were authorized at Alturas Station and San Antone Station. The Legislature appropriated \$114,131 for this purpose.

- (g) The Division of Forestry has grown to an organization of substantial size with facilities throughout the State. To manage this organization efficiently it is essential that clear, concise, and uniformly interpreted instructions be made available to employees at all levels. To accomplish this objective the Legisla-

ture authorized an Assistant Deputy State Forester and an Intermediate Stenographer in the 1966-67 fiscal year and appropriated \$19,625 for this purpose.

- (h) Positions due to added workload (1 Associate Construction Analyst, 2 Delineators, 3 Intermediate Stenographers, 3 Carpenters, 2 Forester II, 3 Forester I, 2 Electricians, 1 Automotive Maintenance Foreman, 4 Heavy Equipment Mechanics, 1 State Forest Ranger) were added at an estimated cost of \$263,072.
- (i) The remaining difference can be attributed to merit salary adjustments and an increase in operating funds to cover price increase for doing the same level of business as recognized by the Department of Finance.
- (2) Allotment of funds to other agencies for the protection of State and private land for which the Division is responsible has been increased \$187,568. The increase can be attributed to a 4-percent salary increase, a price increase in recognition of the increased cost of maintaining the same level of service, and an augmentation to provide for equivalent fire prevention effort on State responsibility areas protected by cooperating counties and the U.S. Forest Service.
- (3) Emergency Fire Fund is a basic appropriation of \$200,000. The need has exceeded \$2,000,000 in an extremely bad fire year. Augmentations from so-called Governor's Emer-

gency Fund are requested when need arises. The anticipated 1966-67 expenditure is \$1,300,000.

- (4) Paid to U.S. Forest Service in matching expenditures for Field projects.
- (5) To be expended in cooperative control projects in areas of serious infestations.
- (6) Specified items of Research and Development described under that heading in this report.
- (7) Totals set forth represent *net* expenditures of the Division. Gross expenditures, approximately \$43,600,000, are reimbursed by:
 - (a) From the U.S. Government in support of the Oak Glen Job Corps Conservation Center \$884,500 (does not include capital outlay).
 - (b) Rural-Structural fire protection \$4,942,365 (contracts with Counties and Fire Districts).
 - (c) From U.S.D.I.; fire protection of 3.6 million acres of scattered public domain lands \$497,000.
 - (d) Other reimbursements—collection for services to employees, rentals to other agencies, services to other agencies, etc., \$1,727,407.
- (8) Capital Outlay funds total \$9,078,174. Of this amount \$5,506,735 represents unexpended balances from prior year appropriations.

It is of some interest to review fund allocations to the Division of Forestry, and numbers of employees, for prior years. The comparison, in Table 3, indicates a fairly substantial increase in funds during the five-year period since 1962, but only a very minor increase in number of full-time employees.

Table 3. Comparison of funds allocated to the Division of Forestry, and number of full-time employees, during the last five years.

	5 yrs. ago: 5-year avg.			
	1966	1965	1962	1962-1966
Funds, gross (millions)	\$43.736	\$42.319	\$31.307	\$37.249
Employees, full-time	2,624	2,464	2,451	2,483

Manpower Utilization and Personnel Management

During 1966, there were 363 new permanent appointments made to fill vacant positions in the Division. There were 2,547 yearlong employees, and at the peak of the fire season total employment reached 4,512, including seasonal drivers and firefighters. Twelve Forestry Graduate Trainee and six Forestry Field Trainee positions were filled by recent forestry school graduates and high potential career employees from the Foreman classes, as a part of the Division's recruitment and career development program. Thirteen trainees were promoted to Junior Foresters to continue preparing for later appointments to technical forestry or administrative positions.

Seventeen Division employees retired during the year; two for disability reasons. Among the retirees

were four Rangers with long careers with the Division. George Britton, State Forest Ranger III, retired from Santa Clara Ranger Unit after 33 years of service; Lester Gum, State Forest Ranger I, retired from Santa Cruz Ranger Unit after 34 years of service; Arthur Moberg retired as manager of the Davis Forestry facility, after 37 years of service; and Ernie Werder, State Forest Ranger I, retired from San Mateo Ranger Unit, having been with the Division since January 1, 1962, when the San Mateo Unit became part of the Division of Forestry; prior to that time he was Forester and Firewarden of San Mateo County, having worked for the county for over 30 years. The other retirees were:

Fred Trask, Forestry Foreman I, Lassen County
 Eugene W. Smith, Forestry Foreman I, San Diego County
 Frank V. Thomas, Forestry Foreman II, San Diego County
 John L. Gibson, Forest Fire Truck Driver, Shasta County
 Jack R. Harris, Groundsman, Davis
 R. C. Chaplin, Forestry Foreman I, Tulare County
 Ray A. Frazier, Forestry Equipment Operator, Siskiyou County
 Louis Soto, Forestry Foreman I, Humboldt County
 Paul J. Holderman, Forestry Foreman II, Tehama County
 Philip L. Ashcraft, Groundsman, Sonoma County
 Robert D. Vance, Forestry Foreman II, Slack Canyon

In development of a manpower utilization and personnel management system much progress was made by employee organizations; and our capability to work effectively with such organizations in the public interest has improved. At the close of the year, the following employee organizations were registered with the Executive Office:

Region VI California Division of Forestry
Employees Association
California Division of Forestry Employees
Association
California State Firemen's Association
Union of State Employees Local 411, AFL-CIO
California State Employees' Association

Clerical and Allied Services Employees Association
of California
California State Forestry Fire Fighter Association

During the year, acceptable progress was made in reviewing our existing classification and pay plan for the classes State Forest Ranger I, II, and III. One product of this effort was identification of goals, work assignments, and interrelationships of ranger units. These data will be used for a comprehensive ranger unit organization study. We will try to arrive at the ranger unit organization that will produce best results in achieving program goals.

We believe the several ranger study task forces will have a final recommendation for evaluation during 1967.

ENGINEERING AND CONSERVATION CAMPS

Engineering and Construction

The Engineering and Construction Section is responsible for establishment of standards for engineering and construction. This includes the areas of acquisition of land, surveys, mapping and delineation, design, construction, and maintenance. These standards are largely developed within parameters established by the Departments of Public Works and General Services. Specific sections within several State codes also provide authorization and direction in this regard.

Three forest fire stations received a new complement of buildings—West Point, Cathay, and Smith Creek. A new equipment storage and warehouse building was constructed at our District I Headquarters location. A new office building was completed at the Orange Ranger Unit Headquarters. The first phase of the Oak Glen Job Corps Conservation Center expansion was completed. Several major projects are now under construction including three new conservation camps, and three ranger unit headquarters. In addition, 97 minor construction projects were worked on State-wide, 38 of which were completed.

Four administrative maps were revised. Conversion to scribing for all administrative map production was commenced when the Lassen-Modoc map was initiated. The Sign Handbook was completely revised and released to the field late in 1966.

Work was done on 32 land acquisition projects during 1966. One acquisition was converted to a lease, and two projects were completed. Nineteen of the 29 remaining projects are in either appraisal or actual negotiation stage. One hundred thirty-four rights-of-way have been processed.



New barracks and messhall at West Point Forest Fire Station, Calaveras County. Three stations received a complement of new buildings in 1966.

The year 1967 will see the completed revision of instructions for processing rights-of-way. Other objectives include completion of the road design handbook, and a complete set of instructions on site selection and processing land acquisition projects.

Conservation Camp Program

Objectives of the Conservation Camp Program are twofold: (1) To provide a useful work program to assist in rehabilitation of inmates and wards; and (2) to provide a pool of trained manpower to reinforce fire control forces.

On December 31, 1966, there were 37 active conservation camps in operation, with a total population of

2,880 inmates and wards (table 4). Four of these were youth camps, having a population of 360 wards—this includes three 20-ward spike camps.

Table 4. Conservation camp statistics for 1966.

Active Camps	Type	Population
33	Adult inmates	2,520
4	Youth Authority wards	300
3	Spike camp—Youth Authority wards.....	60
Total population		2,880

The 37 camps are distributed among our six Administrative Districts as follows: North Coast and Sierra Cascade districts, seven camps each; Central Sierra and San Joaquin districts, six camps each, with one spike camp in the Central Sierra District and two in the San Joaquin; Central Coast and Southern California districts, three and eight camps, respectively.

During 1966, one 80-man camp was opened, at Cuyamaca, in San Diego County.

Construction was begun on two camps: Eel River and Growlersburg. Activation of the Eel River Camp is planned for January 1967; Growlersburg is to be activated in late spring. Site preparation has been completed for the Ortega and Bautista camps. The budget has included funds for replacement of Pine Grove and Ben Lomond camps, which have superannuated structures dating from the Civilian Conservation Corps era. Working drawings for these camps have been completed by the Division of Architecture; contracts are scheduled to be let during 1967.

Inmates and wards of the Conservation Camps worked a total of 6,831,628 man hours during 1966. Of this total, 12.4 percent was on forest fire suppression; the remainder was on a wide variety of other conservation activities (table 5).

Table 5. Work performed by conservation camps during 1966.

Activity	Percent of Total
Forest fire suppression	12.4
Camp services and tool maintenance.....	23.1
Hazard reduction, firebreak construction and maintenance	24.6
Truck trail construction and maintenance.....	7.2
Forestry utility systems, maintenance and development	11.5
In-camp projects	7.7
Nursery work, planting and forest demonstration.....	1.7
Forest insect and disease control8
Miscellaneous conservation work	1.3
Public campground and recreational development.....	5.0
Game and fish habitat improvement.....	2.5
Training, rescues, and other	2.2
Total	100.0



A shaded fuelbreak in the lower coastal mountains. Conservation camp inmate crews, supervised by Division of Forestry personnel, using hand sprays to maintain control of brush, two years after initial clearing of the fuelbreak.

The Conservation Camp Program has slowed to future planning, subject to availability of inmates. Several camps are in the planning or budgeting stage. One camp (Bautista) was changed from an adult to a youth conservation camp, due to the added pressures of ward population.

Land acquisition is in progress for the Tamarack Camp in District II; the same applies to the new site in District IV to replace the old Murietta Camp.

Oak Glen Job Corps Conservation Center

The Oak Glen Job Corps Conservation Center, a few miles north of Beaumont, Riverside County, was constructed in 1949 as a unit of the Conservation Camp Program. In 1963, this camp was selected for the pilot California Youth Conservation and Training Program created by the State Legislature. This program was designed as a working model for teaching unemployable young men traits and attitudes necessary for regular employment, while they performed conservation work and received educational and vocational training in a camp setting. With the advent of the Federal Anti-Poverty Program and the Job Corps, the California Youth Conservation and Training Program was terminated by the State on June 1, 1965. At that time, Oak Glen became a Job Corps Conservation Center, operated under provisions of a contract between the State of California and the Office of Economic Opportunity.

In general, the contract calls for the Division of Forestry to operate Oak Glen as a Job Corps Conservation Center with full reimbursement of costs to the State by the Office of Economic Opportunity. One of

the first activities under the Job Corps program was expansion of camp capacity. A new school building was constructed; modifications were made to the dining hall, and to the office to provide room for a dispensary; and capacity was increased to 120 enrollees. Plans call for construction of a new barracks and a gymnasium, to increase camp capacity to 170 enrollees. With increased capacity and program additions, increases in staff were necessary. Present plans call for a 52-man staff to operate the center at its capacity of 170 enrollees. Specialized staff positions in education, vocational training, counseling, and medical technology are authorized. Due to the nature of the work, a new series of civil service classes was established for supervision.

The basic objective of the Job Corps is to teach disadvantaged youth attitudes and basic skills which they need to function in a normal society. Corpsmen are recruited under Federal standards from all over the United States. They receive intensive training while in the Job Corps, including basic and remedial education, counseling, introductory vocational training, and basic work habit development while performing conservation work. All physically fit enrollees receive basic fire and safety training; crews of corpsmen under the supervision of Forestry Foremen have made a good record on forest fires in the Southern and Central areas of the State. Conservation work is still recognized as one of the major factors in the development of the

corpsman's sense of accomplishment, self-pride, and working ability.

Neighborhood Youth Corps

This program, operated under provisions of the Economic Opportunity Act, is designed to help unemployed youth gain job experience and develop work habits and attitudes necessary for regular employment. The Division of Forestry participated by identifying needed jobs which could be done by some of these youth, and providing on-the-job supervision and training for them. Screening and referral of youth to the Division of Forestry for these jobs is done by the Department of Employment or by other sponsoring non-profit groups such as Youth Opportunity Centers.

Twenty-two jobs were identified in six Forestry units and referrals were made by sponsoring groups which resulted in 19 of these jobs being filled for various lengths of time. The jobs themselves ranged from clerical work for young women to auto shop helpers, groundsmen, and general work for young men.

Some difficulty was experienced in developing and processing the agreements necessary for the Division of Forestry to cooperate in this program, but this should be less of a problem as the sponsoring agencies become more experienced in this aspect of the program.

An additional agreement was recently signed by the San Luis Obispo County School Department to enable the Division of Forestry to participate in the Neighborhood Youth Corps program in that county.

PUBLICATIONS OF 1966

Publications in the following list, issued during 1966, were prepared by or in cooperation with the Resources Agency. They are directly related to forestry affairs.

Papers and Reports Processed by Division and Department

- "State Forester's 1965 Report," 23 pp.
- "Reforestation Studies—1965," by Ronald S. Adams, 13 pp.
- "Forest Nurseries—1965-66," by C. J. Eden, 8 pp.
- "California State Forests, 1964-65," 15 pp.
- "Emergency Revegetation of Burned Watersheds—1965," 12 pp.
- "Brushland Range Improvement—1965," 17 pp.
- "Production of California Timber Operators in 1964," by Daniel Dotta. State Forest Note No. 27, 6 pp.
- "Artificial Shade Improves Survival of Planted Douglas-Fir and White Fir Seedlings," by Ronald S. Adams, John R. Ritchey, and W. Gary Todd. State Forest Note No. 28, 11 pp.
- "Redwood Sprouts on Jackson State Forest," by Brian R. Barrette. State Forest Note No. 29, 8 pp.

- "California Cone Crop for 1966," by C. J. Eden. State Forest Note No. 30, 6 pp.
- "Drilling vs. Broadcast Seeding on the Ranchita Range Study," by Cecil Pierce, Richard Bawcom, and Marvin Dodge. Range Improvement Studies No. 16, 6 pp.
- "Seed Handling and Seeder Calibration by Weight," by Samuel F. Gossard. Proceedings of the 10th Biennial Western Forest Nursery Council Meeting, Placerville, California, August 1966.
- "Nursery Program of the California Division of Forestry," by C. J. Eden. Proceedings of the 10th Biennial Western Forest Nursery Council Meeting, Placerville, California, August 1966.
- "Guidelines for the Design and Purchase of Rural Fire Equipment," by Don Swain. August 1966. 28 pp.
- "A Study of Redwood Region Forestry," by California State Board of Forestry. June 1966. 26 pp.
- "Relationship of Land Use to 1964-65 Flood," by California State Board of Forestry. Reissued 1966. 92 pp.
- "Selected Annotations from California Appellate Decisions on Arson and Fire Fraud," by George W. Berdan. 147 pp.

Publications Resulting From Cooperative Effort of Division

- "Forest Pest Conditions in California—1965," California Forest Pest Control Action Council, State Printing Office. 20 pp.
- "Markets for Woodland Products in California," by William A. Dost and Walter P. Bemis. U.C. Agricultural Extension Service, September 1966, 23 pp.
- "Fire Retardant Chemicals—An Aid in Slash Disposal," by Marvin Dodge and James B. Davis. *Journal of Forestry*, February 1966.
- "Wise Use of Natural Resources has Changing Values," by DeWitt Nelson. *Journal of Forestry*, April 1966.
- "Factors Influencing Oviposition and the Effect of Temperature on Development and Survival of *Enoclerus lecontei* (Wolcott) Eggs," by Alan A. Berryman. *The Canadian Entomologist*, June 1966.
- "The Antennal Receptors and Olfactory Response of *Ips confusus* (Coleoptera: Scolytidae) to Male Sex Attractant in the Laboratory," by John H. Borden and David L. Wood. *Annals of the Entomological Society of America*, March 1966.
- "Interspecific Mating and Cytological Studies of Closely Related Species of *Ips* DeGeer and *Ortholomicus* Ferrari (Coleoptera: Scolytidae)," by Gerald N. Lanier. *The Canadian Entomologist*, February 1966.
- "The Effects of Gamma Radiation of the Biology and Behavior of Adult *Ips confusus* (Le Conte) (Coleoptera: Scolytidae)," by D. L. Wood and R. W. Stark. *The Canadian Entomologist*, January 1966.
- "Sex Pheromones of Bark Beetles. I. Mass Production, Bioassay, Source and Isolation of the Sex Pheromon of *Ips confusus* (Le Conte) (Coleoptera: Scolytidae)," by D. L. Wood, R. M. Silverstein and J. O. Rodin. *Journal of Insect Physiology*, June 1966.
- "Root Disease Survey at Boggs Mountain State Forest, California," by R. U. Bega, D. Dotta, D. R. Miller, and R. S. Smith, Jr. *Plant Disease Reporter*, June 1966.
- "Determining the Age of Dwarfmistletoe Infections on Red Fir," by Robert F. Scharpf and J. R. Parmeter, Jr. *U.S. Forest Service Research Note P.S.W. 105*, September 1966.
- "Effects of Cold Nights on Root Regeneration of Ponderosa Pine Seedlings," by Stanley K. Krugman and Edward E. Stone. *Forest Science*, December 1966.
- "Natural Regeneration of Douglas-Fir [*Pseudotsuga menziesii* (Mirb.) Franco] on Blodgett Forest in the Mixed Conifer Type in the Sierra Nevada," by John C. Tappeiner. Ph.D. Dissertation, School of Forestry, University of California.
- "The Ecology of Vertebrate Control," by Walter E. Howard. Proceedings 19th Conference of Southern California Weed and Vertebrate Pest Control Regulatory Officials, April 1966. pp. 7-17.
- "Chinkapin Log Grades and Lumber Yield," by Dean R. Prestemon, Fred Dickinson, and William Dost. California Forestry and Forest Products No. 42, July 1965.
- "Tanoak Log Grades and Lumber Yield," by Fred Dickinson and Dean Prestemon. California Forestry and Forest Products No. 41, February 1965.
- "Properties and Drying Procedures for Chinkapin in California," by Helmuth Resch and Shui-mu Huang. California Forestry and Forest Products No. 41, February 1965.
- "Pacific Madrone Log Grades and Lumber Yield," by Fred Dickinson, Dean Prestemon, and William Dost. California Forestry and Forest Products No. 43, July 1965.
- "Soils and Vegetation of the Manzanita Lake Quadrangle, Shasta County, California," by J. I. Mallory, B. F. Smith, E. N. Gladish, and E. B. Alexander. State Cooperative Soil-Vegetation Survey. 1966.
- "Soils and Vegetation of the Ono Quadrangle, Shasta County, California," by J. I. Mallory, E. B. Alexander, and E. N. Gladish. State Cooperative Soil-Vegetation Survey. 1966.
- "Water Repellant Soils and Their Relation to Wildfire Temperatures," by L. F. DeBano and J. S. Krammes. Bulletin of the I.A.S.H. XI Annee No. 2: 14-19, 1966.
- "Sex Attractants in Frass Produced by Male *Ips confusus* in Ponderosa Pine," by Robert M. Silverstein, J. Otto Rodin, and David L. Wood. *Science* 154(3748):509-510. October 28, 1966.

Printed Articles and Books (by Division Personnel)

- "Principles of Forest Fire Management," by C. Raymond Clar and Leonard R. Chatten. Revised Edition. State of California, Division of Forestry, Sacramento. 1966. 274 pp.
- "Excerpts from State Fire Laws Applicable to Forest Fire Prevention," compiled by Fire Prevention Section. Leaflet.
- "California Forest and Fire Laws—1966," compiled by Fire Prevention Section. Revised 1966. 412 pp.

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